

Sleuth: The Case of the Missing Yo-yos

Overview

The purpose of this exercise is to allow students to solve a problem by going through the scientific process. The students must find out the thief in a toy store robbery through observation and deductive reasoning. By using a series of liquid reagents on white powder samples and some thoughtful insight, the students can deduce the culprit.

Objectives

- Organize data and observations into a reasonable structure.
- Follow written procedural instructions.
- Work within a group to solve a problem.
- Follow acceptable experimental procedure to solve a problem.

Materials

- 1 cup Sugar (Sample A) 1 cup Flour (Sample B) 1 cup Salt (Sample C)
- 1 cup Baking Soda (Sample D)
- 1:1 Baking Soda/Flour mixture (Sample CS = powder found at the crime scene)
- Water (reagent 1) Vinegar (Reagent 2) Iodine (Reagent 3)
- White plastic or paper drinking cups (15 per group)
- Something to add the reagent dropwise to the powders in the cups.

Preparation

1. The iodine used is regular store bought 2% Tincture of Iodine. Take 2 tablespoons of the Tincture of Iodine and dilute with one pint of water. The solution will have a roughly clear appearance.
2. For the sample found at the store, mix thoroughly a half cup of baking soda and a half cup of flour.
3. Select 15 white plastic or paper drinking cups for each group. Label five of the cups A, B, C, D and CS.
4. Place about 1 tablespoon of samples A-D and CS in each of the appropriately labeled cups.
5. You or the students need to then divide each of the five samples into three equal portions and place each one in a separate cup and label each one with the appropriate sample letter. (For a total of 15 cups) Thus, each sample can be tested with three different reagents.
6. Create and label the reagent

Names _____, _____ **and**

Who did it?

The Rio Grande Toy Store in Albuquerque was robbed last night of several cases of rare silver plated New Mexican Yo-yos. The thief got away but did leave a clue: An unknown white powder was left on the floor of the store. After further investigation, it was discovered that only four companies in Albuquerque make white powders. After we visited each company, we know that following employees do not have alibis: Rotton Rodney, Bubbly Bertha, Shifty Sammy, and Dingy Doris.

We have obtained a sample of powder from each company and the Toy Store. Your job is to analyze the powders and figure out who did it? You will be asked to explain your group's answer.

Here is our data so far:

White Powder	Look and feel	Reagent 1	Reagent 2	Reagent 3
Sample A: Rotten Rodney				
Sample B: Bubbly Bertha				
Sample C: Shifty Sammy				
Sample D: Dingy Doris				
Powder at Toy Store				

Summary

1. Which sample matches the powder found at the Toy Store?

2. Who do you think did the robbery?

3. Why? What is your reasoning?
